

## **REMARKS**

Applicants have now had an opportunity to carefully consider the Examiner's comments set forth in the Office Action of July 18, 2008. All of the Examiner's objections and rejections are responded to herein. Reexamination and reconsideration of the application is requested.

### **In The Office Action**

Claims 18, 21-25, 29, and 36-47 remain in the application.

Claims 18, 21-22, and 24-25 (section 2 of the Office Action) and claims 36-42 (section 5) are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2,162,294 to Manfred in view of WO 86/02103 to Barkman.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable based on the combination of Manfred, Barkman, and DE 19919738 to Kuehn (section 3).

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable based on the combination of Manfred, Barkman, and U.S. Pat No. 4,496,312 to Yamada (section 4).

Claims 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable based on Manfred and teachings that would have been obvious to one of ordinary skill in the art (section 6).

Claims 43 and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 1,362,296 to Hagan in view of JP 05-239558 to Osamu (section 7).

Claim 44 is further rejected under 35 U.S.C. 103(a) as being unpatentable based on the combination of Hagan, Osamu, and Kuehn (section 8).

Claim 47 is further rejected under 35 U.S.C. 103(a) as being unpatentable based on the combination of Hagan, Osamu, and Barkman (section 9).

### **Claims 18, 21-22, 24-25 and 36-42 are Not Rendered Obvious**

#### **by Manfred in view of Barkman**

The Examiner contends that claims 18, 21-22, 24-25 and 36-42 are rendered obvious in view of a combination of Manfred in view of Barkman (sections 2 and 5 of the Office Action). Applicant respectfully disagrees. While Manfred illustrates a rotary hearth furnace comprising outer and inner walls and partitions adapted to divide the

furnace chamber into a heating zone and at least one treatment zone, Manfred fails to teach several other limitations.

First, Manfred only teaches one opening in the outer wall of the furnace chamber. The Examiner contends that Manfred "discloses it is well known in the art to utilize separate apertures and/or flaps for loading the furnace and/or removing the treated stock (see page 1 paragraph 3)." However, Manfred's teaching is only in conjunction with the use of a U-shaped masonry furnace such that the "separate arrangement of loading and unloading flaps presents the possibility of placing a stationary partition radially into the annular space" of the furnace so as to better maintain temperature (page 1, lines 20-34). Thus, Manfred is discussing stationary partitions, not movable partitions. On the contrary, the claims which have been rejected on this basis recite a rotary furnace with movable vertical doors/partitions and not a U-shaped furnace having stationary partitions. In fact, Manfred teaches away from such a two door construction (see page 1 lines 36-65).

Second, Manfred fails to teach a charging sluice that is disposed exterior to the furnace chamber (as now reflected in currently amended claim 18). Note the sluices 12,17, 37 shown in Figures 1-2 of the present invention. Placing the sluice exterior to the furnace chamber provides the advantage of reducing temperature/atmospheric variation within the furnace chamber due to the charging/discharging of parts.

Third, Manfred lacks any teaching regarding a quenching bath and associated sluice. The Examiner relies on Barkman for this teaching. However, Barkman fails to teach a sluice means (or lock of Barkman) connecting the second opening and to the quenching bath. Rather, Barkman teaches a diffusion chamber 10 located between the exit lock 9 (second opening) and a further lock 11 (which the Examiner suggests is the sluice means) and the oil bath 12 (quenching bath). Applicants fail to see how a "sluice" (defined as channel or trough for conducting a material [often in a liquid]) could be considered the lock 11 of Barkman.

More importantly, the oil bath 12 is spaced from the exit lock 9 of Barkman by the diffusion chamber 10 and the lock 11. The fundamental difference is that the diffusion or treatment zones are located next to the rotary furnace of the instant invention. In applicants' view, Barkman can be seen as teaching away from the claimed invention by

having a diffusion chamber separating the quenching bath from the furnace. In addition, the Barkman arrangement is contrary to the rationale set forth by the Examiner that it would have been obvious to one of ordinary skill in the art to modify Manfred's rotary hearth with the quenching bath and sluice arrangement disclosed in Barkman. The Examiner's rationale is that such an arrangement would facilitate the immediate subsequent rapid cooling of the work pieces upon completion of heat treatment. But no such immediate cooling is shown by Barkman. The Barkman device would actually prolong the process from heating in the furnace to quenching since the parts being treated must first pass through the external diffusion chamber 10 of Barkman.

In addition to the foregoing, applicants respectfully submit that the proposed combination of Manfred and Barkman is improper. In applicant's view, the Examiner has relied on impermissible hindsight in attempting to combine the teachings of Barkman and Manfred using applicants' own claims as a template to pick and choose those prior art elements which are necessary in order to meet the claimed invention. However, this was done without providing any reasons as to why it would have been obvious to do so. In formulating a rejection under 35 U.S.C. § 103(a) based on a combination of prior art elements, it remains the Examiner's obligation to identify the reasons why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed. It is applicants' view that this has not been done. Thus, Manfred in view of Barkman does not render claim 18 obvious, as amended.

As to claim 21 and while relying on Manfred, the Examiner states that it would have been obvious to "set the two openings such that they are wider than being 'juxtaposed at close intervals' to facilitate alleviating the temperature difference between the start and end treatment zones (page 5, paragraph 2 of the Office Action). By contrast, and as illustrated in Figure 1 of the present invention, the first opening 11 is separated approximately 45° from the second opening 16 such that the circumferential pathway travelled by the part to be treated is maximized (in the illustrated embodiment), thus providing more versatility in the number and length of various heating, diffusion/carbonization or other treatment zones. Therefore, the limitations of claim 21 are neither obvious nor are they the mere rearrangement of parts in terms of the positioning of the two openings.

With respect to claim 22, the Examiner asserts that it would have been obvious to one of ordinary skill in the art to modify the rotary hearth of Manfred with a second opening and by the quenching bath and sluice arrangement of Barkman such that the two openings can be used both as charging and discharging openings. Applicants respectfully disagree. As discussed previously, Manfred's rotary hearth includes a single opening via which the parts are placed into the furnace and later removed from the same opening. On the other hand, Barkman illustrates a dedicated entry opening or lock 8 and a dedicated exit opening or lock 9.

In contrast to these two references, the present invention provides first and second openings which may both be employed as charging and discharging openings. In other words, both openings may be used to add or remove parts from the furnace while the furnace is in operation. As such, the furnace of the present invention can perform treatment of parts on a part by part basis. For this reason, it is believed that the Examiner's combination of Manfred and Barkman fails to teach the claimed invention (particularly in light of currently amended claim 18). Furthermore, it is believed that such a combination is improper on the basis that the Examiner has relied on impermissible hindsight in attempting to combine the teachings of Barkman and Manfred, using applicants' claims as a template to pick and choose prior art elements from disparate references in order to meet the claims without providing reasons as to why it would have been obvious to do so.

Contrary to the Examiner's position regarding claims 24 and 25, the limitation of a second quenching means is not merely the duplication of parts. As illustrated in Figure 2 and as taught by the present application, a quenching/hardening device 35 is located adjacent to the first opening 31 and a second quenching device 38 is located adjacent to the second opening 36, wherein each of the quenching devices is connected to their respective openings by a sluice. The second quenching means is provided for at least the reason that either opening may be used as a charging/discharging opening (which is consistent with the features claimed in claims 22) thus allowing the rotary hearth furnace of the present invention to run different heat treatment schemes. With reference to Figure 2 of the instant application, and by way of example only, a part introduced from the second opening 36 travelling clockwise to the

first opening 31 can or will experience a different heat treatment cycle prior to being subjected to the quenching device 35 than a part introduced to the furnace chamber via the first opening 31 and travelling counter-clockwise to the second opening 36 and being subject to the quenching process by the quenching means 38. Thus, as it pertains to claims 24 and 25, the addition of a second quenching means is neither obvious nor the mere duplication of parts.

As it pertains to claim 36, Manfred only teaches that the hearth is rotatable in one direction via the use of a hydraulically actuated ratcheting mechanism (see the Manfred Abstract). Neither Manfred nor Barkman teach a bi-directional rotary furnace. As such, neither claim 36 nor dependent claims 37-42 can be rendered obvious since at least this limitation and others (as previously discussed with reference to claim 18) are not taught by the prior art combination.

**Claim 23 is not Rendered Obvious By Manfred, Barkman and Kuehn**

As to claim 23 (section 3 of the Office Action), the Examiner asserts that the limitation of a "first opening for charging disposed vertically above the furnace chamber and is coupled to a charging sluice disposed vertically above the furnace chamber and designed as an elevator sluice" is obvious over the combination of Manfred, Barkman and Kuehn. Furthermore, the Examiner asserts that the elevator sluice arrangement is simply the rearrangement of parts in terms of placement. Applicants respectfully disagree.

First, Kuehn fails to teach the limitations of claim 23. For one, the opening 4 of Kuehn is disposed laterally and not vertically above the furnace chamber. Similarly, the quenching member 7 is also disposed to the side or laterally with respect to the furnace chamber of Kuehn. Second, the vertical orientation of the first opening and the charging sluice is not merely the rearrangement of parts as asserted by the Examiner. Such an arrangement is provided for the vertical manipulation of parts and has the advantage of allowing the opening for charging to be disposed relatively close or immediately adjacent to the discharging opening (see paragraph 10 of the published application). Thus, use of the furnace along its circumference is maximized while the overall footprint of the rotary furnace is reduced. This contrary to the rationale set forth by the Examiner

that such an arrangement would be used to facilitate the automated transportation of work pieces into the furnace.

For these reasons, claim 23 is not obvious in light of the Manfred, Barkman, and Kuehn combination.

**Claim 29 is not Rendered Obvious by Manfred, Barkman and Yamada**

With regard to claim 29 (section 4 of the Office Action), the Examiner asserts that Yamada in combination with Manfred and Barkman teach that all of the doors of the rotary hearth furnace are individually controllable. In particular, the Examiner points to the mechanism 32 for raising and lowering the door 28 as illustrated in Figures 1-4 of Yamada (and referring to column 3, lines 9-26). Admittedly, Yamada illustrates separate mechanisms for raising door 28 and door 32. However, Yamada fails to teach that the doors are individually controllable. In fact, the doors 28 and 29 appear to operate together to allow material to move by the doors when the hearth is rotated. Moreover, in referring to the summary of the invention of Yamada (column 1, lines 20-33), the object of the invention is to provide “a heat treatment system including no more than one heating chamber and one cooling chamber.” Thus, if the doors were in fact individually controlled, such that one door could be left open while the other closed, the entire circumferential space of the furnace chamber would become one common space. Thus, the furnace would cease to have a distinct heating chamber and a distinct cooling chamber as required by the teachings of Yamada. Therefore, Yamada cannot be properly combined with Manfred or Barkman to render claim 29 obvious.

**Claims 36-42 are not Rendered Obvious by Manfred in view of Barkman**

With respect to claims 36-42 (section 2 of the Office Action), Applicants restate their arguments as presented with respect to claims 18, 21-22 and 24-25. The primary distinction between claims 36 and 18 is that claim 36 requires that the rotary hearth furnace to be rotated in one of a clockwise and counterclockwise direction. The Examiner asserts that such a feature would have been obvious to one of ordinary skill in the art in view of the teachings of Manfred. Applicants respectfully disagree. No reason can be seen why one skilled in the art should have carried out these steps in

combination with a furnace hearth which is rotatable in both directions. In fact, none of the references provide a reason for wanting to vary the length of treatment and, hence, a need for bidirectional rotation. Thus, Applicants believe the Examiner is using impermissible hindsight in promulgating this rejection.

Moreover, and as pointed out with respect to claim 18, the Manfred/Barkman combination fails to teach a first quenching device and a second quenching device.

As to the remaining claims 37-47, these claims are allowable based on their dependency on claim 36, which is not rendered obvious for the reason set forth above.

**Claims 43-47 are not Rendered Obvious by Manfred**

Applicant's arguments with respect to claims 18, 21-22, 24-25 and 36-42 are restated here for the purpose of illustrating that claims 42-47 are also not obvious in light of Manfred. With respect to claims 44-47, these claims are allowable by virtue of their dependency on an allowable base claim, namely, claim 43, for the reasons stated previously.

**Claims 43, 45 and 46 are not Rendered Obvious By Hagan in view of Osamu**

With respect to claims 43, 45 and 46 (section 7 of the Office Action), the Examiner asserts that Hagan discloses a moving heating furnace, wherein the chamber may be moved in a clockwise direction and/or in reverse. While the Examiner cites figure and page and line numbers, none of the cited areas are seen by applicants to explicitly teach that the hearth may be rotated in either of a clockwise or counterclockwise direction. Note the arrow in Figure 1. While a reversal of movement is mentioned offhand on page 4 at line 21, this is done only to further heat the articles. Presumably, the movement would again be reversed so that the articles could be discharged. At any rate, this embodiment of Hagen only works with swinging doors 40 and 42 and not with vertically movable doors, as recited in claim 43.

As such, at least this limitation is not met by Hagan and therefore, the combination of Hagan in view of Osamu would not teach all the limitations of claim 43 even if they were to be combined. Similarly, and by virtue of their dependency, claims 45 and 46 cannot be rendered obvious.

**Claim 44 is not Rendered Obvious by Hagan in view of Osamu and Kuehn and**  
**Claim 47 is not Rendered Obvious by Hagan in view of Osamu and Barkman**

For similar reasons, claims 44 and 47 were rejected based on a combination of Hagan, Osamu and either Kuehn or Barkman (sections 8 and 9 of the Office Action). For the reasons stated previously, neither claim 44 or 47 can be rendered obvious based on the lack of a teaching of a rotary hearth that may rotate in either of a clockwise or counterclockwise direction.

In summary, the cited references do not give any indication of a reason why one



of ordinary skill in the art would have combined the prior art elements shown in Manfred, Barkman, etc. to arrive at a rotary hearth furnace including 1) a furnace hearth which is rotatable in both directions, 2) two charging/discharging openings provided in the outer wall of a furnace chamber of the furnace hearth, and 3) a sluice and quenching means combined with at least one of the charging/discharging openings.

In this connection, attention is drawn to the Memorandum dated May 3, 2007 from Deputy Commissioner for Patent Operations Margaret Focarino to the Technology Center Directors in wake of the Supreme Court decision in KSR Int'l Co., v. Teleflex, Inc.

Therefore, all remaining claims are believed to patentably define over the cited references, in any combination. Prompt and favorable examination of pending claims 18, 21-25, 29, and 36-47 is therefore respectfully requested.

### **CONCLUSION**

For the reasons detailed above, it is respectfully submitted all claims remaining in the application claims (18, 21-25, 29, and 36-47) are in condition for allowance. It is submitted that the foregoing comments do not require unnecessary additional search or examination.

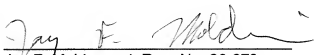
No fees are believed to be due by way of this Amendment. However, if a fee is due, the undersigned attorney of record hereby authorizes the charging of any such fee(s), except for the issue fee, to Deposit Account No. 06-0308.

In the event, the Examiner considers personal contact advantageous to the disposition of this case, he or she is encouraged to call the undersigned at the phone number listed.

Respectfully submitted,

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